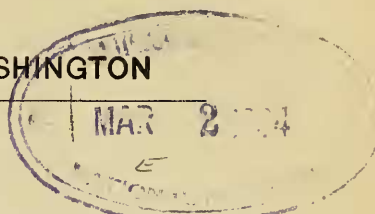


PROCEEDINGS
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THE LONG-TAILED MEADOW-MOUSE OF
SOUTHEASTERN ALASKA.

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The long-tailed meadow-mouse of the Sitkan district, southeastern Alaska, has commonly gone under the name of *Microtus macrurus* Merriam (Proc. Acad. Nat. Sci. Phila., 1898, p. 353), described from Lake Cushman, Olympic Mountains, Washington. From the first, Alaskan specimens so-called were recognized as being slightly different, but nevertheless it has been assumed that *Microtus macrurus* inhabited the coastal strip from Puget Sound north to Yakutat Bay. In 1919 Mr. Joseph Dixon and myself collected a series of specimens along the valley of the lower Stikine River whereby I was able to demonstrate intergradation between the gray *Microtus mordax* of interior British Columbia and the brown "*macrurus*" of the Alaskan coast, and I accordingly labelled the latter *Microtus mordax macrurus* (Univ. Calif. Publ. Zool., vol. 24, 1922, p. 175). At about the same time A. B. Howell had independently arrived at essentially similar conclusions (Journal of Mammalogy, vol. 4, 1923, pp. 33-37), evidently without having seen my own paper. This was all right so far as it went, but my findings had been based entirely on Alaskan material and at the time I did not appreciate the resulting corollaries affecting typical *macrurus* of the Olympic Mountains.

For some years past I have devoted considerable thought, with several seasons of field work, to study of the relationships of the closely adjacent faunas of northern British Columbia and southeastern Alaska. The accumulating evidence goes to show that much of the mammal fauna of the Sitkan district is directly derived from the hinterland east of the Coast

Ranges; that it does not form part of a homogeneous population ranging unchanged the length of the humid coast belt. There are exceptions, of which the Black-tailed Deer is an example, but I have no hesitation in making this rather positive statement of affinities and derivation of most of the Sitkan mammals. With birds it is different (and with plants also, I believe), for much of the avifauna had its origin on the southern coast, but even in the birds there is a certain proportion that provides interesting examples of derivation from the interior.

In this connection it is well to consider the other species of *Microtus* of the Sitkan district. *Microtus sitkensis*, on Baranof and Chichagof islands, is of boreal origin (of the *operarius* group), reaching these northern islands along with certain other more northern forms of life that, with it, do not extend south of Christian Sound and Frederick Sound. The *Microtus pennsylvanicus* stock is widespread in eastern North America, it extends west to the Rocky Mountains in the United States, crosses that range near the Canadian boundary, and (in the race *drummondi*) is abundant as far as the Coast Range in northern British Columbia, a mode of distribution that is repeated over and over again among mammals and birds of the last mentioned region. This meadow-mouse has even found its way through the Coast Range in at least two places, following the valleys of the Taku and Stikine rivers, but although known to occur at the mouths of those streams, it has not spread along the adjacent Alaskan coast. *Microtus pennsylvanicus admiraltiae*, a slightly differentiated offshoot, is restricted to Admiralty Island. The position of this island directly opposite the mouth of the Taku River, and the nebulous character of the differences between *admiraltiae* and *drummondi*, are sufficiently suggestive of the recent derivation and course of travel of the island mouse.

Of most of the small mammals of the Sitkan district there is similar evidence of northern or eastern relationships. Such an exceptional mode of distribution as has been ascribed to *macrurus*, comprising the narrow coastal strip from Puget Sound north into Alaska, should be carefully scrutinized. Furthermore, the demonstrated intergradation between *mordax* of inland British Columbia and "*macrurus*" of the Sitkan district, via the Stikine Valley, implying derivation of the Alaskan stock from the neighboring interior, leaves the more widely different typical *macrurus* of the Olympic Mountains unexplained in relationship to the northern forms.

Derivation of the Alaskan stock of this species from the interior is inferred from satisfactory reasons. Intergradation of the sort described is commonly accepted as the test of subspecific difference. It implies, I believe, impending separation of parts of a previously homogeneous form (witness the common definition of a subspecies as an incipient species); and, on the other hand, to the best of my belief does not occur when two related forms (even some that are designated as subspecies) approach and meet subsequent to their differentiation in other regions. The last mentioned condition is illustrated in several bird groups in this northwestern country. For examples, the Russet-backed Thrush (*Hylocichla ustulata ustulata*) and Olive-back Thrush (*H. w. swainsoni*) meet in the Stikine

Valley without blending; the Red-shafted Flicker (*Colaptes cafer*) and Yellow-shafted Flicker (*Colaptes auratus*) meet in the Skeena Valley, to result in parti-colored individuals that are commonly regarded not as intermediates but as hybrids. It is safe to say that the Sitkan district was colonized by animal and plant life at a more recent date than the region east of the Coast Ranges or than the coastal region to the southward, and in nearly every case the mammal and bird species of the Sitkan district betray in their physical characteristics or in their mode of local distribution, often in both, the source whence they came.

In the case of the *Microtus* under discussion, if it really were genetically close to *macrurus* of the Olympic Mountains it must have invaded the Sitkan district from the southward, have met with *mordax* of the upper Stikine Valley at a much later period, and have combined with that species to have produced the gradual blend of characters that is evident over so wide an area. These are the corollaries above referred to that I did not grasp at the time when the subspecific relationship of *mordax* and Alaskan "*macrurus*" became clear to me. Of late, realization of the improbability of this situation impelled comparison of specimens from the several regions involved.

True *macrurus* is a rare animal in collections, and in all my previous work on northern mammals I had contented myself with the published statements pertaining to that form, which was no longer satisfactory. In aid of the present study I have been able to borrow from the United States Biological Survey three topotypes of *Microtus macrurus*, and from Field Museum, Chicago, eight more specimens from the Olympic Mountains. Of these eleven specimens, four are fully adult. The Biological Survey series includes also six specimens from Rivers Inlet and three from Lund, localities on the mainland coast of southern British Columbia. I have also had available the large series of *Microtus* of the Sitkan district, Alaska (mostly collected by myself), that is in the Museum of Vertebrate Zoology, University of California.

Comparisons of the several series (and with special reference to three fully adult *macrurus* in the Field Museum collection) is corroborative of the suspicion that the Alaskan form should not be regarded as *Microtus macrurus*. I propose to call it

***Microtus mordax littoralis*, new subspecies.**

Type.—Male adult, skin and skull; no. 8642 University of California Museum of Vertebrate Zoology; Shakan, Prince of Wales Island, Alaska; May 14, 1909; collected by H. S. Swarth; original number 7463.

Geographic range.—Mainland coast and most of the islands of southeastern Alaska. On the coast from Yakutat south at least to Bradfield Canal. On most of the islands of the Alexander Archipelago that lie east of Chatham Strait and to the southward.

Diagnosis.—A long-tailed meadow-mouse of the *Microtus mordax* aggregation. From *M. mordax mordax* of the adjacent interior of British Columbia, *littoralis* differs in being reddish-brown instead of grayish in general aspect, and in having a somewhat longer tail. Intergradation

between *mordax* and *littoralis* has been traced along the valley of the Stikine (see Swarth, Univ. Calif. Publ. Zool., vol. 24, 1922, pp. 175-178).

Measurements.—Type: Length, 189 mm.; tail vertebrae, 72; hind foot 22. Ten adults, Prince of Wales Island, Alaska (average, minimum and maximum): Length, 189.3 mm. (172.0-207.0); tail vertebrae, 73.3 (63.0-80.0); hind foot, 21.1 (20.0-22.0). *Microtus macrurus*: "Average of five specimens from three localities in the Olympic Mountains: 204; 80; 24.3" (Bailey, N. Am. Fauna, 17, 1900, p. 51).

Measurements taken by different individuals, especially under the conditions ordinarily affecting the field collector, are not a satisfactory basis for fine comparisons, but, making all necessary allowances, adult examples of *Microtus macrurus* are clearly larger than any form of *mordax* that I have seen (except *Microtus coronarius*). *Macrurus* is darker colored, less reddish above; and the belly is darker colored than in *littoralis* and not so sharply contrasted with the sides. In *macrurus* the tail is longer. In most specimens it is scantily haired, almost the same color above and below; only in the younger examples does it approach the sharply bicolored effect that is the rule in *littoralis*.

The skull of adult *macrurus* is appreciably larger than that of *littoralis*, reflecting the general size differences that are apparent in the externals of the two. Despite the greater size, the skull of *macrurus* presents a weaker appearance, being built on more slender lines, with the zygomata less wide set and angular than in *littoralis*, the nasal region rather more elongated.

I can not now regard *macrurus* as a subspecies of *Microtus mordax*, the available specimens being few in number and otherwise unsatisfactory as a basis for such a decision. The several skins at hand from the British Columbia mainland at Lund and Rivers Inlet I am content for the present to consider the same as *macrurus* of the Olympic Peninsula, but it will require much more material and from localities not now represented in collections before satisfactory conclusions can be reached regarding relationships and distribution of the long-tailed forms of *Microtus* of the Puget Sound region. Elliot (Field Colum. Mus., Zool. Ser. I, 1899; p. 257) remarks of *macrurus*: "This large species was only procured by me on the banks of the Elwah and was not seen on the high mountains, so I concluded it was an inhabitant of the lowlands, possibly, indeed, also a littoral form." The Lund and Rivers Inlet occurrences are corroborative of this view. I believe that there is close relationship between *Microtus macrurus* and *M. tetramerus* of Vancouver Island, which is not surprising, considering the geographical situation. The Vancouver Island mouse is smaller and slightly more reddish, but it has the same sort of tail as *macrurus*, though a shorter one, and the same character of skull.

The assumption of continuous distribution of *macrurus* along the coast north from Puget Sound to Alaska was never based upon specimens. Between those points lie some hundreds of miles of shore line almost unknown zoologically. Considerable field work has been done on Vancouver Island and on the Queen Charlotte Islands, but otherwise the entire coast of British Columbia, mainland and islands, awaits even the most cursory inspection of its fauna. Neither are there available any *Microtus* from the

southernmost 125 miles of the adjoining Alaskan mainland. I, myself, trapped at several points in the last mentioned territory without result, though I got specimens on some of the neighboring islands.

Howell (*loc. cit.*) remarks: "Specimens of *macrurus* from southern Alaska are puzzling. Series from almost every locality available show slight, consistent differences, but in no case are these sufficient for subspecific rank, and they must all be included under the one name." This condition, as well as peculiarities of distribution, might be explained under the theory I am here advancing, namely, that these mice have found their way to the Alaskan coast from the adjacent interior and by several routes, the Alaskan population therefore consisting of colonies derived from slightly different sources and perhaps remaining separated up to the present time. This is just the situation that we can see exists in the case of the forms of *Microtus pennsylvanicus* in the same region.

In southeastern Alaska there is a peculiar development in the existence of *Microtus coronarius*, a giant form of the same stock as *M. mordax littoralis*, and one that has apparently originated in its present environment. It has been taken on Coronation, Warren and Forrester islands, a disconnected habitat that is as yet inexplicable. There are other islands along the western edge of the Alexander Archipelago on which no zoological collecting has been done, and such work, when it comes, may bring a better understanding of this variant.

I wish to express appreciation to the officials of the United States Biological Survey, of Field Museum, Chicago, and of the Museum of Vertebrate Zoology, University of California, for the privilege of bringing together the material upon which these comments are based.